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Establishment and Beginning of Pilot Operation of the 2nd Korean Antarctic Research Station “Jang Bogo” at Terra Nova Bay

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1. Introduction

The Republic of Korea circulated a/the draft Comprehensive Environmental Evaluation (CEE) for consideration at the CEP in June, 2011. The CEP XIV had concluded that the draft CEE met the requirements of Article 3 Annex 1 to the Protocol on Environmental Protection to Antarctic Treaty and recommended it to the ATCM for endorsement. The final CEE for the Jang Bogo Station was prepared incorporating all the valuable suggestions received from the Parties and was assessed at the CEP XV (IP-23) and ATCM XXXV in June 2012.

The site of the Jang Bogo Station (74°37.4′S / 164°13.7′E) had been chosen through an evaluation process which began in 2006 and considered the national research interests and the suitability for international collaboration. The site is located near Cape Möbius, the coastal area of Terra Nova Bay in Northern Victoria Land along the western Ross Sea.

The station includes a main building, research facilities, and maintenance facilities with a building area of 4,411.46 m^2. The station is planned to be used for no less than 25 years. It will accommodate up to 15 personnel in the winter and up to 60 personnel in the summer.

After two seasons of construction, the 2nd Korean Research Station Jang Bogo was opened by the Korean Ministry of Oceans and Fisheries and Korea Polar Research Institute (KOPRI) in early 2014. The inauguration ceremony took place at the Jang Bogo Station accompanied by nation-wide interest on 12 February 2014.

Figure 1: Inauguration ceremony held in front of the main building of the Jang Bogo station on 12 February 2014

2. Progress during the season 2013/14

2.1 Transportation

MV *DANUBE*, an ice strengthened cargo ship, was mobilized for transport of materials and equipment for the second phase of the construction activity from Pyeongtaek Port in Korea to the construction site in Terra Nova Bay, Antarctica. The ship left Pyeongtaek Port with 13,188 m^3 of bulk cargo and 327 containers on 27 October 2013. She stopped in Hobart for bunker MGO fuel for the leg to Terra Nova Bay and Antarctic diesel oil (SAB) for the station operation. The icebreaker RV *ARAON* with 148 construction workers on board left Lyttleton Harbour for the Antarctic on 15 November 2013. The two ships joined at the heavy sea ice edge near 65° S on 26 November and the *ARAON* assisted the cargo ship to access Terra Nova Bay. The cargo ship approached Terra Nova Bay and stopped at the fast ice 1 km offshore from the construction site on 7 December. Unloading began after checking with the sea ice safety and the operation continued for 13.5 days in three-shifts around the clock.

The air-borne transportation of the construction personnel were supported by the Italian, New Zealand and USA Antarctic programs. Thanks to the international collaboration in the Ross Sea Area, the construction team could start the second phase of the construction as early as 31 October 2013. During peak times 287 personnel were employed at the site.

The 49 bulk of returning cargo, mainly comprised of heavy vehicles and construction power plant and 562 TEU containers including parts of construction camp containers were loaded on the cargo ship. The rest of the containers will be transported next season, 2014/2015.

2.2 Construction works

Once the additional construction camp for the second phase was set up, construction was carried out in a planned manner. Virtually all of the planned works has been completed and the remaining work including interior refurbishment will be finished in the austral summer of 2014/2015 (Figure 2).

Figure 2: The Jang Bogo Station with *ARAON* in Terra Nova Bay on 28 February 2014

On 15 March 2014, the station was handed over to the first team of 17 members (including 2 construction personnel for pilot operation) wintering at the Jang Bogo Station.

2.3 Waste treatment and Environmental monitoring

Construction and domestic wastes were collected separately for recycling and reuse if possible. One hundred and twenty-seven 20ft containers with wastes were removed from the site by the cargo ship.

Additional IC-SBR system was installed and two systems were in operation for wastewater treatment during the 2nd construction period. The discharged water quality (BOD, COD, SS, pH, T-P and number of coliform) was checked every two days.

To avoid anthropogenic disturbance to the colony of south polar skua located in the eastern hill of the Gondwana Station, unnecessary visiting by either construction workers or other personnel were strictly controlled and restricted. Low altitude flying of helicopters over the colony was also strictly prohibited. Two ornithologists monitored the colony for one month to observe the impacts. The damaged area by oil spill which occurred last season was monitored by KOPRI's environmental monitoring team and the initial assessment indicated no visible impacts. The area will continue to be monitored for further assessment.

An environmental audit and review of the CEE will be carried out by the KOPRI Environmental monitoring team during the 2014/2015 season.

Figure 3: IC-SBR system for waste water treatment during construction period and a signpost notifying the restricted area to protect the south polar skua colony

2.4 Accident

Regrettably, a helicopter (Kamov-32) fire accident occurred while the vehicle set down on the *ARAON* on 4 December 2013. Fire was extinguished quickly and prevented from spreading, with no visible damage to the ship and the surrounding environment and with minimal impact to the construction schedule. Best efforts were made to contain the incident in accordance with the applicable guidelines. Eleven personnel (including 2 pilots) on board all managed to escape. Those more badly affected were flown out of the Antarctic with invaluable support from the Mario Zucchelli and McMurdo Stations and received necessary medical attention. The burnt down helicopter was transported to Christchurch by the *ARAON*.

3. The Jang Bogo Station facilities

The triple-arm shaped central main building connects to individual facilities in a radial arrangement. The station layout is intended not only to provide safety, functionality, and efficiency, but also to limit land usage. Major facilities are composed of research facilities, a power plant, maintenance and storage buildings, waste treatment facilities, communication antennas and observatories. Further information on the facilities of the Jang Bogo Station is provided in the final Comprehensive Environmental Evaluation which was presented at the ATCM XXXV (IP-23).

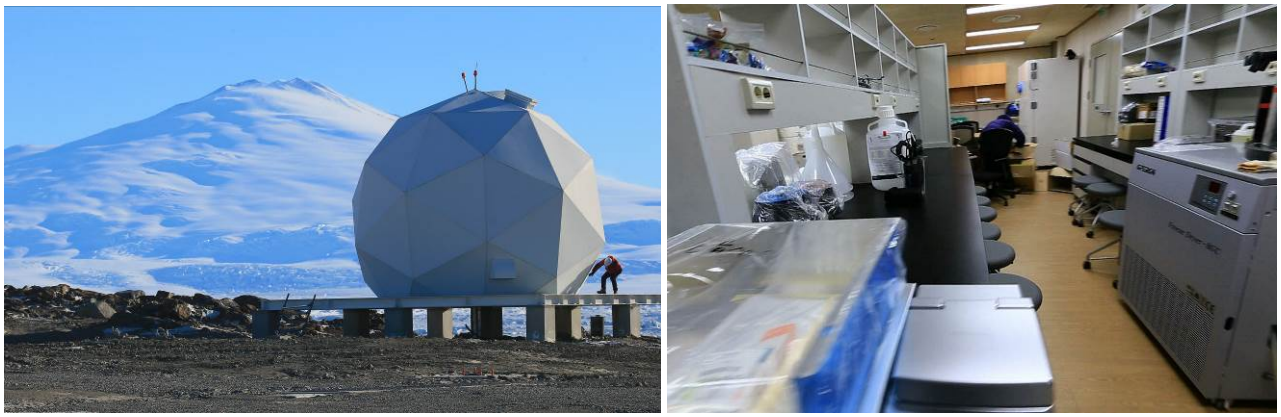

Figure 4: Satellite antenna for communication and an interior view of the Life science & Oceanographic laboratory

Figure 5: An Aerial view of the Jang Bogo Station before loading the construction camp containers

4. Science at the Jang Bogo Station

Science at the Jang Bogo Station will provide crucial information in understanding the global system. Climate and atmospheric chemistry, tectonic and geophysics, Antarctic ionosphere and thermosphere monitoring, long-term monitoring for ocean and ecosystem, and meteorology are some of the topics that will be studied. However, there is currently no permanent observatory for continuous observation within at least 300 km radius of the Jang Bogo Station. The sea-level monitoring of greenhouse gases at the station will operate as a permanent WMO/GAW and is expected to add valuable resources of atmospheric compositions. As the Jang Bogo Station lies within the aurora zone, it is ideally situated for space weather studies.

A new comprehensive Jang Bogo research project is about to be launched with the support of Korean Ministry of Oceans and Fisheries. International science collaborations are already underway during construction periods with the Antarctic research programs of Germany, Italy, New Zealand and the United States.

5. Acknowledgement

The Republic of Korea is very grateful to all the national and international partners who contributed to the success of the Jang Bogo project over the years. First of all we highly appreciate the work done by the construction consortium as well as the scientists and staff of KOPRI and other supporters during the period.

The very successful international cooperation of air-borne and ship-borne transportation was a vital part of the construction project. We thank the master and crew *of MV SUOMIGRACHT, MV DANUBE,* and *R/V ARAON*.

During the construction period, Russian experts shared their knowledge and experience for sea ice safety.

Special thanks are due to our neighbours at the Italian Mario Zucchelli Station and American McMurdo Station for their unwavering support whenever it became necessary. Here we would like to express our sincere thanks to all the Parties for their assistance as well.